

Interactive
Comment

Interactive comment on “Greenland Ice Sheet sensitivity and sea level contribution in the mid-Pliocene warm period – Pliocene Ice Sheet Model Intercomparison Project PLISMIP” by S. J. Koenig et al.

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This paper presents the ice-sheet model results of the PLISMIP study; a major step forward in our understanding of Greenland ice sheet evolution under mid Pliocene warm conditions with implications for future Greenland ice sheet behavior. The authors find that the climate forcing via a GCM is a larger source of uncertainty than any one ice-sheet model's physics. I like the paper and it should be published with some minor revisions (namely, the references have some problems).

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Interactive Discussion

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Major comment After reading this paper and returning to it a few days later to write this review, I'm left feeling that the discussion is somewhat thin; this is a large endeavor and can any insight into new directions be given beyond that the GCM is a larger uncertainty? Such a large international endeavor, I think, should start banging the drums on what we don't know to push for further international efforts and also give some reason for say IODP drilling that can help not only with ice-sheet reconstructions, but also the needed climate (the PRISM data set is actually quite poor/absent around the Greenland - the actual 'dated' data that comes from this 1/8 of the world is on the other side of ocean fronts from Greenland; exception Eirik Drift which they've cut out from the more recent summaries).

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9 - Add in Robinson et al. 2012 Nature Climate Change and Levermann et al. 2013 PNAS to this list of GrIS response to anthro changes

17 - Add in Robinson et al. 2012 here again, they show hysteresis.

22 - this reference list has problems. Rasmussen et al., Dahl-Jensen et al. and Johnsen et al. are all ice-core studies of d18O change that are not over the last few interglacials. NGRIP and NEEM should be referenced for this. Overpeck et al. is really just a summary of insolation and sea level data. I would cut. Cuffey & Marshall are a modeling study that should be moved to the next reference list. The authors neglect actual records of ice-sheet extent and should add these here - Colville et al. (2011, Science) and Reyes et al. (2014, Nature) - that constrain the GrIS during MIS 5e and 11 (actually only studies to do this so far on margin constraints).

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8-13 - the last summary of the Kap Kobenhaven concluded it was ~2.4 Ma or younger in age (Funder et al., 2001). It is thus in the Quaternary, not the Pliocene. The authors may confuse the fact that up until ~5 years ago, the Pliocene extended up to 1.8 Ma.

It now ends at 2.64 Ma. Regardless, current understanding would argue that this is wrong to include the KK in this summary. Likewise, the Ile de France is really really poorly dated and if correlative, is not from the Pliocene, but earliest Pleistocene (again, redefined Pleistocene). Willerslev et al. dated their only recoverable DNA from the base of Dye 3 to mid Pleistocene age (400 ka -1 something Ma); this is not evidence for Pliocene forests. de Vernal & Hillaire-Marcel only presented high-res Pollen records back 1 Ma, not to the Pliocene. So remove the references to the poorly dated sites that are thought to be early Pleistocene. Also remove the Willerslev et al. and de Vernal & Hillaire-Marcel references as these are clearly Pleistocene stories. the place to get some info on the records is the cruise reports in ODP results volume 105 in 1989; de Vernal & Mudie for Baffin Bay site 645 and them again for site 646 on Eirik Drift.

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1-3 - there is no reference given here and I know of no evidence/data that would say there were either substantial fluctuation in GrIS cover of Greenland during the Pliocene or intervals of little or no ice. The existing IRD records are the only actual proxy dated to that period and they just show IRD presence. I would remove this sentence.

5 - Why not mention here the GIA effects that drove the Raymo et al. paper? Giving this range and not mentioning that it really is largely an effect of the ensuing glacial periods is quite important.

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25-30 - How is precip lapsed? Not indicated.

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11 - What about Bamber et al. (2013, The Cryosphere) updated topography and ice volume? This should be mentioned here and how the update may affect results as compared to modern.

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15-16 - So, these vegetation reconstructions mentioned, at least sum, don't date to the Pliocene (i.e., Funder et al. and Willerslev et al.) - rather the early to mid Pleistocene. Revise and remove the Pleistocene references.

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